

## Appendix E

### SUMMARY OF AIR QUALITY IMPACT ANALYSIS FOR THE POTRERO POWER PLANT UNIT 7 PROJECT

September 26, 2000

#### BACKGROUND

Mirant Potrero LLC has submitted a permit application (# 1355) for a proposed 540 net-MW combined cycle power plant, the Potrero Power Plant Unit 7 Project (PPP). The PPP is to be composed of two natural gas-fired turbines and two supplementally fired heat recovery steam generators. The proposed project will result in an increase in air pollutant emissions of NO<sub>2</sub>, CO, PM<sub>10</sub> and SO<sub>2</sub>, triggering regulatory requirements for an air quality impact analysis.

#### AIR QUALITY IMPACT ANALYSIS REQUIREMENTS

Requirements for air quality impact analysis are given in the District's New Source Review (NSR) Rule: Regulation 2, Rule 2.

The criteria pollutant annual worst case emission increases for the Project are listed in Table I, along with the corresponding significant emission rates for an air quality impact analysis.

Table I  
Comparison of proposed project's annual worst case emissions  
to significant emission rates for air quality impact analysis

Pollutant	Proposed Project's Emissions (tons/year)	Significant Emission Rate (tons/year) (Reg-2-2-304 to 2-2-306)	EPA PSD Significant Emission Rates for major stationary sources (tons/year)
NO <sub>x</sub>	178.4	100	40
CO	265.1	100	100
PM <sub>10</sub>	110.5	100	15
SO <sub>2</sub>	51.9	100	40

Table I indicates that the proposed project emissions exceed District significant emission levels for nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and respirable particulate matter (PM<sub>10</sub>). The source is classified as a major stationary source as defined under the Federal Clean Air Act. Therefore, the air quality impact must be investigated for all pollutants emitted in quantities larger than the EPA PSD significant emission rates (shown in the last column in Table I). Table I shows that the NO<sub>2</sub>, CO, PM<sub>10</sub> and SO<sub>2</sub> ambient impacts from the project must be modeled. The detailed requirements for an air quality impact analysis for these pollutants are given in Sections 304, 305 and 306 of the District's NSR Rule and 40 CFR 51.166 of the Code of Federal Regulations.

## Appendix E

The District's NSR Rule also contains requirements for certain additional impact analyses associated with air pollutant emissions. An applicant for a permit that requires an air quality impact analysis must also, according to Section 417 of the NSR Rule, provide an analysis of the impact of the source and source-related growth on visibility, soils and vegetation.

### AIR QUALITY IMPACT ANALYSIS SUMMARY

The required contents of an air quality impact analysis are specified in Section 414 of Regulation 2 Rule 2. According to subsection 414.1, if the maximum air quality impacts of a new or modified stationary source do not exceed significance levels for air quality impacts, as defined in Section 2-2-233, no further analysis is required. (Consistent with EPA regulations, it is assumed that emission increases will not interfere with the attainment or maintenance of AAQS, or cause an exceedance of a PSD increment if the resulting maximum air quality impacts are less than specified significance levels). If the maximum impact for a particular pollutant is predicted to exceed the significance impact level, a full impact analysis is required involving estimation of background pollutant concentrations and, if applicable, a PSD increment consumption analysis. EPA also requires an increment analysis of any PSD source which increases NO<sub>2</sub> or PM<sub>10</sub> concentrations by 1 µg/m<sup>3</sup> or more (24-hour average) in a Class I area.

#### *Air Quality Modeling Methodology*

Maximum ambient concentrations of NO<sub>2</sub>, CO, PM<sub>10</sub> and SO<sub>2</sub> were estimated for various plume dispersion scenarios using established modeling procedures. The plume dispersion scenarios addressed include simple terrain impacts (for receptors located below stack height), complex terrain impacts (for receptors located at or above stack height), impacts due to building downwash, inversion breakup fumigation, and shoreline fumigation.

Turbine emissions will be exhausted from two 180 foot exhaust stacks. Table II contains the emission rates used in each of the modeling scenarios: turbine commissioning, maximum 1-hour (which includes start-up), maximum 3-hour, maximum 8-hour, maximum 24-hour, and maximum annual average. Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation.

The applicant used the EPA models SCREEN3, ISCST3, and SHORTZ. A land use analysis showed that the urban dispersion coefficients were required for the analysis. The models were run using one year of meteorological data (1992) collected at the meteorological station at the project site, formerly known as the P G and E Potrero Power Plant (the meteorological station is located 275 meters to the east of the proposed stack locations and is shown as a purple dot in Figure 1). Because the exhaust stacks are less than Good Engineering Practice (GEP) stack height, ambient impacts due to building downwash were evaluated. Because the land use analysis showed that urban dispersion coefficients were required and complex terrain was located nearby, the model SHORTZ was used in addition to ISCST3 for receptor elevations above stack height. Both inversion breakup and shoreline fumigation were evaluated using the SCREEN3 model. Using 1992 one-hour ozone data from the San Francisco Arkansas Street Monitoring Station, one-hour NO<sub>x</sub> impacts were converted into one-hour NO<sub>2</sub> impacts using the Ozone Limiting Method. The Ambient Ratio

## Appendix E

Methodology (with a default NO<sub>2</sub>/NO<sub>x</sub> ratio of 0.75) was used for determining the annual-averaged NO<sub>2</sub> concentrations.

Table II  
Averaging period emission rates used in modeling analysis (g/s)

Pollutant Source	Max <sup>1</sup> (1-hour)	Commissioning <sup>2</sup> (1-hour and [8-hour])	Maximum (3-hour)	Maximum (8-hour)	Maximum (24-hour)	Maximum Annual Average
NO <sub>x</sub>						
Turbine 1	2.55	25.5	—	—	—	2.57
Turbine 2	21.4	21.4	—	—	—	2.57
CO						
Turbine 1	3.73	37.3 [37.3]	—	3.73	—	—
Turbine 2	69.0	69.0 [18.3]	—	18.3	—	—
SO <sub>2</sub>						
Turbine 1	0.777	—	0.777	—	0.777	0.777
Turbine 2	0.777	—	0.777	—	0.777	0.777
PM <sub>10</sub>						
Turbine 1	—	—	—	—	1.39	1.59
Turbine 2	—	—	—	—	1.39	1.59

<sup>1</sup>Max emissions correspond to the emission characteristics which created the highest impacts during screening runs: one turbine in startup mode with the other turbine in normal operating mode. <sup>2</sup>Commissioning is defined as the original startup of the turbines and only occurs during the initial operation of the equipment after installation. Commissioning emission estimates are based upon one turbine in startup mode with the uncontrolled emissions from the other turbine 10 times higher than emissions during normal operation.

### *Air Quality Modeling Results*

The maximum predicted ambient impacts of the various modeling procedures described above are summarized in Table III for the averaging periods for which AAQS and PSD increments have been set. Shown in Figure 1 are the locations of the maximum modeled impacts. The highest short-term impacts (1, 3, 8 and 24-hour averages) occur during shoreline fumigation conditions and are shown to occur all at one location. The model SCREEN3 is a conservative screen method for predicting shoreline fumigation impacts. As such, the SCREEN3 model only provides distance downwind to the maximum impact. Because shoreline fumigations only occurs as a plume moves inland away from the body of water, it was assumed that the shoreline fumigation impacts were directly 3.1 km west of the project site (as seen in Figure 1).

Also shown in Table III are the corresponding significant ambient impact levels listed in Section 233 of the District's NSR Rule. In accordance with Regulation 2-2-414 further analysis is required only for those pollutants for which the modeled impact is above the significant air quality impact level. Table III shows that the only impacts requiring further analysis are the 1-hour NO<sub>2</sub> and SO<sub>2</sub> modeled impacts.

## Appendix E

TABLE III

Maximum predicted ambient impacts of proposed project ( $\mu\text{g}/\text{m}^3$ )  
[maximums are in bold type]

Pollutant	Averaging Time	Commissioning Maximum Impact	ISCST3 Modeled Impact	SHORTZ Modeled Impact	Inversion Break-up Fumigation Impact	Shoreline Fumigation Impact	Significant Air Quality Impact Level
NO <sub>2</sub>	1-hour annual	184 —	111 <b>0.67</b>	139 0.12	72.4 —	<b>197</b> —	19 1.0
CO	1-hour 8-hour	688 144	518 65.0	432 59.0	220 77.4	<b>1102</b> <b>388</b>	2000 500
SO <sub>2</sub>	1-hour 3 hour 24-hour annual	— — — —	7.9 6.5 1.3 <b>0.23</b>	6.6 4.9 1.1 0.04	4.7 4.2 1.4 —	<b>23.5</b> <b>21.2</b> <b>1.9</b> —	— 25 5 1.0
PM <sub>10</sub>	24-hour annual	— —	3.06 <b>0.64</b>	2.7 0.1	3.0 —	<b>3.9</b> —	5 1.0

<sup>1</sup> The 24-hour PM<sub>10</sub> concentration is the highest second-high concentration.

### Background Air Quality Levels

Regulation 2-2-111 entitled “Exemption, PSD Monitoring,” exempts an applicant from the requirement of monitoring background concentrations in the impact area (section 414.3) provided the impacts from the proposed project are less than specified levels. Table IV lists the applicable exemption standard and the maximum impact from the proposed facility. As shown, all modeled impacts are below the preconstruction monitoring threshold.

TABLE IV  
PSD monitoring exemption levels and maximum impacts  
from the proposed project ( $\mu\text{g}/\text{m}^3$ )

Pollutant	Averaging Time	Maximum Impacts from Proposed Project	Exemption Level
NO <sub>2</sub>	annual	0.67	14
CO	8-hour	388	575
SO <sub>2</sub>	24 –hour	1.9	13
PM <sub>10</sub>	24-hour	3.9	10

The District-operated San Francisco-Arkansas Street Monitoring Station was chosen as representative of the background one-hour NO<sub>2</sub> and SO<sub>2</sub> concentrations. Table V contains the concentrations measured at the station over the past 5 years (1995 through 1999).

## Appendix E

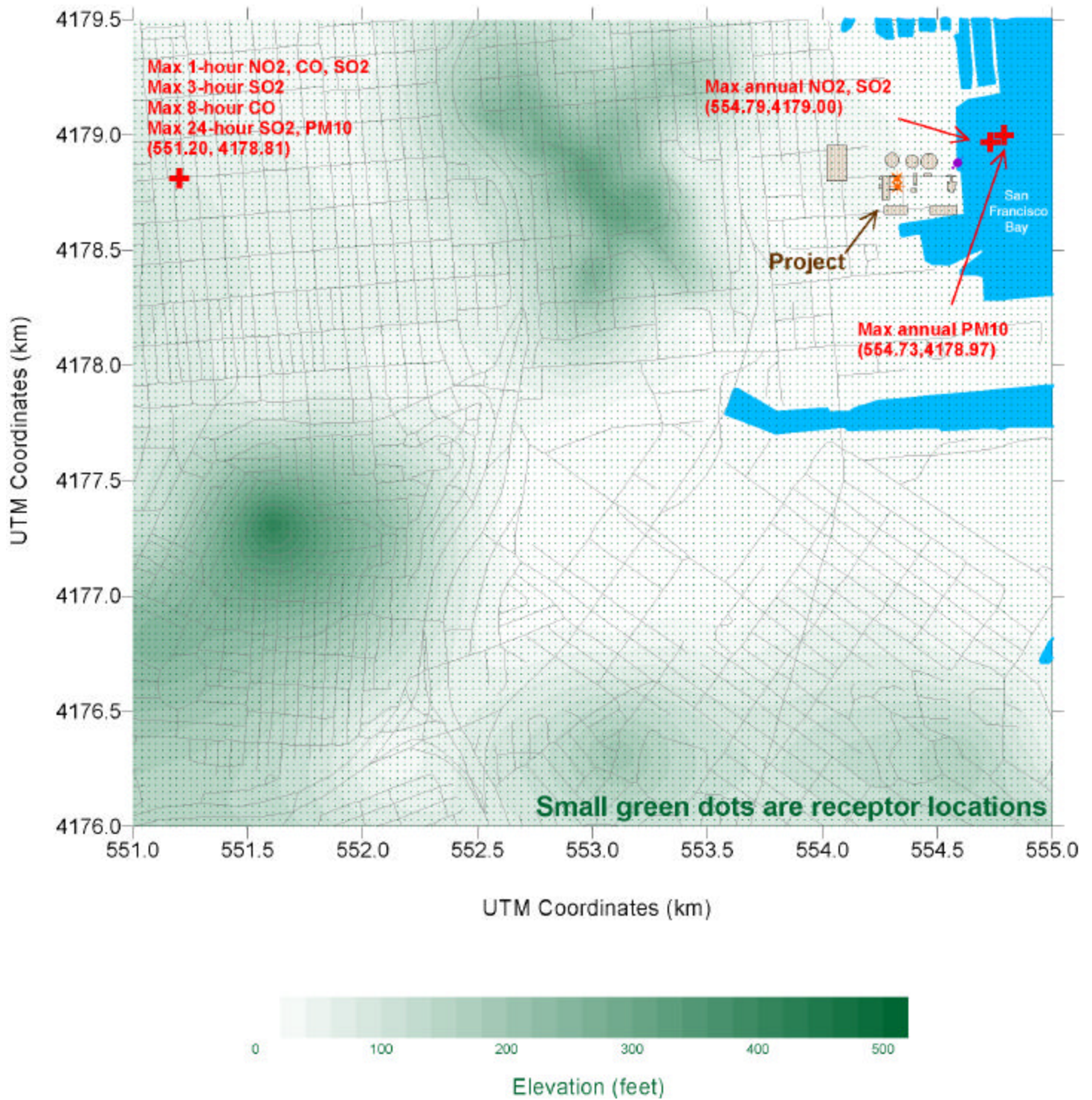


Figure 1. Location of project maximum impacts.

## Appendix E

TABLE V  
Background NO<sub>2</sub> and SO<sub>2</sub> (µg/m<sup>3</sup>) at San Francisco-Arkansas Street Monitoring Station for the past five years (maximum is in bold type)

	NO <sub>2</sub>	SO <sub>2</sub>
Year	Highest 1-hour average	Highest 1 hour average
1995	165	105
1996	152	105
1997	126	80
1998	150	80
1999	<b>194</b>	<b>105</b>

Table VI below contains the comparison of the ambient standards with the proposed project impacts added to the maximum background concentrations. The California ambient NO<sub>2</sub> and SO<sub>2</sub> standards are not exceeded from the proposed project.

TABLE VI  
California and national ambient air quality standards and ambient air quality levels from the proposed (µg/m<sup>3</sup>)

Pollutant	Averaging Time	Maximum Background	Maximum Project impact	Maximum Project impact plus maximum background	California Standards	National Standards
NO <sub>2</sub>	1-hour	194	197	391	470	—
SO <sub>2</sub>	1-hour	105	24	129	655	—

### CLASS I PSD INCREMENT ANALYSIS

EPA requires an increment analysis of any PSD source within 100 km of a Class I area which increases NO<sub>2</sub> or PM<sub>10</sub> concentrations by 1 µg/m<sup>3</sup> or more (24-hour average) inside the Class I area. Pt. Reyes National Seashore is located roughly 33 km to the north northwest of the project, and is the only Class I area within 100 km of the facility. An impact analysis using ISCST3 shows that the maximum 24-hour NO<sub>2</sub> and PM<sub>10</sub> impacts within the Pt. Reyes National Seashore were below the 1 µg/m<sup>3</sup> increments trigger level: 0.5 µg/m<sup>3</sup> and 0.06 µg/m<sup>3</sup> respectively.

### VISIBILITY, SOILS AND VEGETATION IMPACT ANALYSIS

Visibility impacts were assessed using EPA's VISCREEN visibility screening model. The Level II analysis shows that the proposed project will not cause any impairment of visibility at Point Reyes National Seashore, the closest Class I area.

## **Appendix E**

The project maximum one-hour average NO<sub>2</sub>, including background, is 391 µg/m<sup>3</sup>. This concentration is below the California one-hour average NO<sub>2</sub> standard of 470 µg/m<sup>3</sup>. Crop damage from NO<sub>2</sub> requires exposure to concentrations higher than 470 µg/m<sup>3</sup> for periods longer than one hour.

Maximum project NO<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub> concentrations would be less than all of the applicable State and national primary and secondary ambient air quality standards, which are designed to protect the public welfare from any known or anticipated effects, including plant damage. Therefore, the facility's impact on soils and vegetation would be insignificant.

### **CONCLUSIONS**

The results of the air quality impact analysis indicate that the proposed project would not interfere with the attainment or maintenance of applicable AAQS for NO<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub>. The applicant's analysis was based on EPA approved models and calculation procedures and was performed in accordance with Section 414 of the District's NSR Rule.